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Remarks

This Amendment is responsive to the Final Office Action of September 28, 2005. Reexamination and reconsideration of claims 1 and 3-39 is respectfully requested.

Summary of The Final Office Action

The Objections to the Drawings were not repeated in the Final Office Action and thus Applicant assumes the Drawings are now accepted. A formal acceptance of the drawings is respectfully requested.

Claims 1, 3-15, and 22-39 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Field et al. (US Pat. 6,062,681) in view of Kashimura et al. (US Pat. 6,007,193) and further in view of Masaki (US Pat. 6,109,715).

Claims 16-21 were rejected under 35 USC 103(a) as being unpatentable over Field et al. (US Pat. 6,062,681) in view of Kashimura et al. (US Pat. 6,007,193) and further in view of Sullivan (US Pat. 6,264,309).

Withdrawal of Final Rejection

Applicant respectfully submits that the Final Rejection issued on the application is improper based on MPEP 706.07(a) and should be withdrawn.

MPEP 706.07(a) states:

“Furthermore, a second or any subsequent action on the merits in any application or patent undergoing reexamination proceedings will not be made final if it includes a rejection, on newly cited art, ...of any claim not amended by applicant or patent owner in spite of the fact that other claims may have been amended to require newly cited art.”

Independent claim 11 was not amended, yet has now been rejected by newly cited art (Field in view of Kashimura) and the rejection has been made final. Thus, the Final Rejection is improper under MPEP 706.07(a) and should be withdrawn.

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The Present Claims Patentably Distinguish Over the References of Record

The Final Office Action applies the newly cited reference of Kashimura to cure the shortcomings of Field. In particular, the rejection is based on Kashimura purportedly teaching "a second set (3, 42) of resistors primarily configured to be cooperatively energized sufficiently to heat fluid but not primarily to eject the fluid..." The Office Action cites elements 3 and 42 of Kashimura as teaching heating resistors. Although element 3 is a heater, element 42 is not a resister or a heater. Rather, it is a cooling element and thus Kashimura fails to support the rejection.

In particular, element 42 is a heat radiation fin 42 that cools the ink. Column 7, lines 37-38 states:

"As shown in Fig. 2, the ink cooling path 6 is provided with the heat radiation fin 42. The excessively-heated ink I is cooled down to the temperature of 100° C..."

Therefore, Kashimura fails to teach the elements as recited in the rejection and thus fails to support the rejection. As a result, Kashimura fails to cure the shortcomings of Field and thus the references do not teach or suggest the present claims and the rejection should be withdrawn.

Additionally, Kashimura was cited as teaching resistors that are cooperatively energized to cause bubbles to move (bottom of page 3 of Office Action). However, upon examination of Kashimura, the heaters disclosed are not configured to move bubbles. Rather, ink is circulated by the difference in ink levels between ink supply chamber 1 and ink collecting chamber 9 (see last sentence of Abstract and Figure 2). Also, there is a pump 10 between the chambers 1 and 9 (see column 8, lines 47-51, Figure 2).

As for removing air bubbles, Kashimura shows its system in Figure 2. As seen in Figure 2 and its corresponding disclosure, ink is circulated from ink supply chamber 1 through ink supply channel 2 where the ink is heated by heater 3. Air bubbles are then collected in air bubble collecting chamber 5. Then, since the ink is cooled in the ink cooling path 6, additional air

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bubbles are dissolved back into the ink. As can be seen, this is very different from the systems and methods of the present claims.

In particular, Kashimura in column 8, lines 47-67 describe the air bubble removing process as:

"...the liquid state ink 1 is circulated through the ink tank 20 and the manifold 30 due to the maintained difference "h0" in the ink level between the ink supply chamber 1 and the ink collecting chamber 9. With the continuously-moving liquid ink 1, air bubbles are removed from the print head section 7 and the ink cooling section 6. In the circulatory path of the ink, when the ink is supplied from the ink supply chamber 1 to the ink supply channel 2, the ink is overheated by the heater 3. The air dissolving capacity of the ink is decreased, and air bubbles are released from the ink. The air bubbles are collected in the air bubble collecting chamber 5. Accordingly, the amount of air dissolved in the ink is decreased. The ink then cooled at the ink cooling path 6 before the ink enters the print head section 7. The air dissolving capacity of the ink is increased. Accordingly, residual air bubbles, remained in the cooling path 6, are dissolved back to the ink. The above-described air bubble-releasing and -dissolving processes are repeatedly performed as the ink is circulated through the ink tank 20 and the manifold 30."

Thus, one of ordinary skill in the art would clearly understand that it is the ink circulation of Kashimura that causes air bubbles to be moved. The heaters do not move the bubbles. And, it is the positioning of the air bubble collecting chamber 5 that causes the bubbles to be collected and removed. For this additional reason, Kashimura fails to cure the shortcomings of Field and fails to support the present rejections of the claims.

Independent Claim 1

Claim 1 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Field et al. in view of Kashimura and further in view of Masaki. As explained in Applicant's previous response, Field is very different from the present systems and method. For example, Field fails to teach or suggest a second set of resistors that move bubbles present in the fluid to prevent occluding of the ejection chambers as recited in claim 1. This shortcoming was acknowledged in the Final Office Action and Kashimura was then applied to attempt to cure the shortcoming.

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In particular, Field discloses a bubble valve and bubble valve regulator. As shown in FIGS. 1C-1H and disclosed in column 9, lines 35-47, the upstream heater 34 and the downstream heater 35 nucleate the bubble to control its size and its position relative to the constriction 32. As stated in column 10, lines 1-30, the bubble created and positioned by the upstream heater 34 and downstream heater 35 purposely blocks the flow of ink through the constriction 32 to either increase the pressure or to block the flow in its entirety. Field, therefore, discloses using heaters to move a bubble to fully or partially block the flow of fluid. This is the opposite of claim 1. Claim 1 requires that the second set of resistors move the bubbles in the fluid to prevent occluding of the ejection chambers.

Kashimura was used to cure the shortcomings of Field. However, as described above, Kashimura fails to teach or suggest resistors that move bubbles as claimed. Therefore, the rejection is not supported by the references and should be withdrawn.

Since claim 1 recites features not disclosed by the references, individually or in combination, claim 1 patentably distinguishes over the references. Accordingly, dependent claims 3-4 also patentably distinguish over the references and are in condition for allowance.

Independent Claim 5

Based on the previous explanation of Kashimura, Kashimura fails to cure the shortcomings of Field and thus fails to teach each and every limitation of claim 5. Since claim 5 recites features not disclosed by the references, claim 5 patentably distinguishes over the references and is in condition for allowance.

Independent Claim 6

Based on the previous explanation of Kashimura, Kashimura fails to teach or suggest a second set of electrical components as claimed. Thus, Kashimura fails to support the rejection and the rejection must be withdrawn. Therefore, claim 6 patentably distinguishes over the references. Accordingly, dependent claim 7 also patentably distinguishes over the references and is in condition for allowance.

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Independent Claim 11

Claim 11 is directed to multiple electrical components configured to be energized at a first intensity sufficient to vaporize fluid for ejection from individual ejection chambers of a micro electro mechanical systems device, and configured to be cooperatively energized at a second lower intensity sufficient to heat fluid without vaporizing the fluid in a bubble moving pattern designed to move a bubble contained in the fluid in a desired direction.

Claim 11 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Field in view of Kashimura and further in view of Masaki. Field does not disclose multiple electrical components configured to be both energized at a first intensity and at a second lower intensity as required by claim 11, and the Office Action acknowledges this shortcoming. Furthermore, Kashimura fails to teach or suggest this claimed feature and fails to cure the shortcomings of Field. The explanation of Kashimura was provided above.

Since claim 11 recites features not disclosed by the references, claim 11 patentably distinguishes over the references. Accordingly, dependent claims 12-13 also patentably distinguish over the references and are in condition for allowance.

Independent Claim 14

Based on the explanation of Kashimura, Kashimura fails to teach or suggest the plurality of second electrical components as claimed. Kashimura further fails to teach or suggest components that are configured to be energized in a pattern designed to move a bubble as claimed. Rather, Kashimura teaches that ink is circulated by ink levels in chambers 1 and 9 (including a pump 10, see Figure 2). Then, air is collected by air bubble collecting chamber 5.

Therefore, claim 14 recites features not disclosed by the references and thus claim 14 patentably distinguishes over the references. Accordingly, dependent claims 15 and 22 also patentably distinguish over the references and are in condition for allowance.

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Independent Claim 23

Based on the previous explanation of Kashimura, Kashimura fails to cure the shortcomings of Field and thus fails to teach each and every limitation of claim 23. As previously explained, Field fails to disclose moving a bubble that existed prior to the energizing in a desired direction within the micro electrical mechanical systems device to prevent the bubble from restricting the flow of the fluid. Kashimura circulates ink using a pump. Since claim 23 recites features not disclosed by the references, claim 23 patentably distinguishes over the references. Accordingly, dependent claims 24-29 also patentably distinguish over the references and are in condition for allowance.

Independent Claim 30

Field fails to disclose responsive to the energizing, moving a thermal gradient along the fluid to move the bubble in a desired direction to maintain flow of the fluid. Kashimura circulates ink using a pump and thus does not sequentially energize multiple electrical components as claimed. Therefore, the combined references fail to teach or suggest claim 30. Since claim 30 recites features not disclosed by the references, claim 30 patentably distinguishes over the references. Accordingly, dependent claims 31 and 32 also patentably distinguish over the references and are in condition for allowance.

Independent Claim 33

As previously explained, Field fails to disclose a second energizing at least one electrical component of a second set of electrical components primarily to move a bubble contained in a fluid to prevent the bubble from blocking ejection of the fluid from the micro electro mechanical systems device. Kashimura circulates ink (and thus moves bubbles) using a pump and ink levels in ink chambers 1 and 9. Thus, Kashimura fails to teach or suggest energizing at least one electrical component to move a bubble as claimed.

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Since claim 33 recites features not disclosed by the references, claim 33 patentably distinguishes over the reference. Accordingly, dependent claims 34-36 and 38-39 also patentably distinguish over the reference and are in condition for allowance.

35 USC §103 Rejections of Claims 16-21

Claims 16-21 were rejected under 35 USC 103(a) as being unpatentable over Field in view of Kashimura and further in view of Sullivan (US Pat. 6,264,309). Claims 16-21 depend from independent claim 14. As argued above, independent claim 14 recites features not taught or suggested by Field, Kashimura, or a combination of both. Therefore, claims 16-21 also patentably distinguish over the references and are in condition for allowance.

Masaki Reference

Claims 1, 3-15, and 22-39 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Field in view of Kashimura and further in view of Masaki (US Pat. 6,109,715). Masaki was applied for teaching piezoelectric crystals (see Office Action, page 4, second paragraph). Applicant respectfully submits that none of the present independent claims recite a limitation of piezoelectric crystals. Thus, Masaki is not relevant to the independent claims. For this reason, the Examiner will note that the Applicant has treated the rejections above as being based on only Field in view of Kashimura.

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Conclusion

For the reasons set forth above, claims 1 and 3-39 patentably and unobviously distinguish over the references of record and are now in condition for allowance. An early allowance of all claims is earnestly solicited.

Respectfully submitted,

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